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(54) Method of transmitting messages respectively sent from a mobile communication network to a subscriber and received by a subscriber station

- 5 (57) By means of a numerical code (CD) contained in the messages (e.g. USSD2), useful information (e.g. TX1) in a language which the subscriber does not understand can be linked to corresponding useful information (e.g. TX2) in another language in every mobile communication network.
- 10 On receipt of or prior to transmitting the incomprehensible useful information in the message, this corresponding useful information is called up on request from a code table (CTH) in the subscriber's home mobile communication network and transmitted to the subscriber
- 15 station (MS) in a message (e.g. USSD4). In an alternative solution, the incomprehensible useful information together with the numerical code is sent by the mobile switching centre responsible for the subscriber to a separate control unit. The corresponding useful
- 20 information in the other language is obtained from a code table connected to the separate control unit.

#### Description

- 25 Method of transmitting messages sent from a mobile communication network to a subscriber and received by a subscriber station, as outlined in the introductory part of claim 1 and claim 5.

- 30 The country-spanning standardised GSM mobile communication system (Global System for Mobile Communication) covers a plurality of countries in which the respective mobile network operators are nationally

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owned. Whenever supplementary subscriber services are introduced in the GSM mobile communication system, there is a desire on the part of mobile network operators for the new supplementary services to be supported on  
5 subscriber stations which have been in use since the start of standardisation. The transmission of subscriber data from subscriber stations to the systems of the mobile communication network is not critical from the point of view of standardisation because defined  
10 sequences of characters were fixed for subscriber inputs, which are simple and neutral in terms of language. However when it comes to transmitting messages from the mobile communication network to subscriber stations, the situation is somewhat different. Firstly, there is the  
15 problem of knowing which language in the subscriber station the subscriber is able to understand and secondly, there is the matter of knowing the supplementary service in the mobile communication network by which a message is sent to the subscriber during use.

20 The objective of the present invention is to propose a method of the type outlined above, by means of which messages can be also made available to subscribers visiting networks other than their own mobile communication network in a language which they can  
25 understand.

This objective is achieved by the invention as a result of the characterising features defined in claim 1 and in claim 5. Advantageous embodiments of the invention are defined in the dependent claims.

30 Useful information that is not understandable to the subscriber in its existing format can be linked to corresponding useful information in another language in

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every mobile communication network by means of a numerical code respectively contained in the messages. When the incomprehensible message is received or before the incomprehensible message is transmitted, this  
5 corresponding useful information is called up on request from a code table in the subscriber's home mobile communication network and transmitted to the subscriber station in a message.

In another embodiment of the invention, when the  
10 incomprehensible message is received by the subscriber station of the subscriber together with the numerical code, a request for the corresponding useful information to be transferred in the other language is addressed to the mobile switching centre in the other mobile  
15 communication network responsible for the subscriber at that point in time.

It is of advantage if the request, together with the numerical code, is forwarded by the currently responsible mobile switching centre to a central subscriber data base  
20 in the home mobile communication network of the subscriber, and the corresponding useful information in the other language is obtained from a code table connected to the central subscriber data base and returned to the subscriber station via the currently  
25 responsible mobile switching centre.

In another embodiment of the invention, a request, together with the numerical code, is sent by the currently responsible mobile switching centre to a central subscriber data base in the home mobile  
30 communication network prior to sending the incomprehensible message.

In an alternative way of achieving the set

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objective, the messages also contain a numerical code by means of which the useful information to be imparted in the message which is not in a language which the subscriber understands is assigned to corresponding  
5 useful information in another language but a request, together with the numerical code, is sent to a separate control unit before the incomprehensible message is transmitted by the mobile switching centre responsible for the subscriber. The corresponding useful information,  
10 in the other language is obtained from a code table connected to the separate control unit and returned to the subscriber station via the currently responsible mobile switching centre.

The respective code table is therefore defined on a  
15 standardised basis for the entire GSM mobile communication system. However, the appropriate language for the corresponding useful information can be determined by the respective mobile network operator. In situations where it is desirable to use several languages  
20 for useful information to be sent to different subscribers, an appropriate language is respectively fixed for the different sets of useful information in the messages.

It is of particular advantage if a language code for  
25 identifying a language desired by the subscriber is transmitted with the request or supplied by the currently responsible mobile switching centre. The decentralised subscriber data base (VLR) enquires whether the language code exists in the form of a subscriber datum. If it does  
30 exist, the corresponding useful information (e.g. TX2) in the other language is obtained from a code table (CTV) connected to the decentralised subscriber data base (VLR)

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and sent back to the subscriber station (MS) directly.

The invention will be explained in more detail with reference to an embodiment illustrated as an example in the appended drawings. Specifically,

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Figure 1 shows a signal flow chart in which messages are received in a language which the subscriber understands, at the request of the subscriber,

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Figure 2 is a signal flow chart in which messages are received in a language which the subscriber understands, at the request of the mobile switching centre currently responsible for him and

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Figure 3 is a signal flow chart in which messages are received in a language which the subscriber understands, following a request sent by the mobile switching centre currently responsible for him to a separate control unit.

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Figure 1 shows the flow of information between the systems of a mobile communication system operated by the GSM method. The systems exchanging information are a mobile subscriber station MS which can be operated by the subscriber, a mobile switching centre VMSC with a co-operating decentralised subscriber data base VLR in a mobile communication network VPLMN (Visited Public Land Mobile Network), a first code table CTV connected to the decentralised subscriber data base VLR, a central subscriber data base HLR in a mobile communication

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network HPLMN (Home Public Land Mobile Network) and a second code table CTH connected to the decentralised subscriber data base HLR. The mobile communication network HPLMN is the home mobile communication network of the subscriber, whose subscriber data is stored in the central subscriber data base HLR. If the subscriber is not in his home mobile communication network HPLMN but in another mobile communication network, his subscriber data is transmitted to a decentralised subscriber database which belongs to a mobile switching centre currently responsible for the subscriber in this other network, where it is temporarily stored in a locally restricted visitor area for the duration of his visit.

In the case of the example described here, it is assumed that the subscriber is visiting the mobile communication network VPLMN, in which case the mobile switching centre VMSC with the connected decentralised subscriber data base VLR is currently responsible for the subscriber. The subscriber is able to effect subscriber inputs via the subscriber station MS and send them to the mobile communication network VPLMN. Similarly, the subscriber can receive messages containing useful information via the subscriber station MS. Unlike the subscriber inputs, which as a rule consist of fixed sequences of language-neutral characters and digits, the useful information in the messages is usually made up of textual information. Since the subscriber is able to cross national boundaries, situations can therefore arise in which the subscriber receives useful information via his subscriber station MS in foreign mobile communication networks in a language which he does not understand.

If the subscriber wishes to use a specific service,

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he sends a message USSD1 from the subscriber station MS, which is transmitted to the mobile switching centre VMSC responsible for him in the current mobile communication network VPLMN. Information SR identifying the service request and the service type are also sent in the message USSD1. For example, if the service "Call transfer during an ongoing conversation" (Call Transfer) is initiated by the subscriber, this service is processed by the mobile switching centre VMSC responsible for the subscriber at that time. It is assumed that the mobile switching centre VMSC is not able to support the desired service and a message therefore has to be sent to the subscriber, informing him that the requested service is not available.

The mobile switching centre VMSC uses a numerical code CD to access the code table CTV, in which the entries of numerical codes and associated useful information are in a specific language. In the example described here, the useful information TX1, constituting the text "Supplementary Service not available" is read out because the subscriber is located in an English-speaking mobile communication network, for example. Said text is sent back to the mobile switching centre VMSC. The numerical code CD and the useful information TX1 are sent by the mobile switching centre VMSC to the subscriber station MS in a response USSD2.

Assuming that the subscriber does not understand the textual information in the message USSD2 displayed by the subscriber station MS because he has no knowledge of the English language, he has the possibility of launching a message USSD3 from the subscriber station MS. Message USSD3 together with the numerical code CD contains a

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request IS for a translation of the incomprehensible useful information TX1 received, i.e. a request for the useful information to be sent in a language which the subscriber can understand is addressed to the mobile switching centre VMSC responsible for him.

5 A desired language can be specified by the subscriber in the form of a language code contained in the request IS, for example in the form of a part code specifying one of several languages. If, as in this case, the useful information in the requested language can be provided by the responsible mobile switching centre VMSC in the mobile communication network VPLMN by calling it up from the code table CTV, the corresponding useful information is read out in the appropriate language rapidly. The useful information TX2 in the comprehensible language is returned to the requesting subscriber station MS by the responsible mobile switching centre VMSC immediately. In this particular case, German was selected as the appropriate language and the transmitted text therefore reads "Zusatzdienst nicht verfügbar".

20 If the useful information can not be made available by the responsible mobile switching centre VMSC in the requested language directly, the message USSD3 is forwarded together with the request IS and the numerical code CD to the central subscriber data base HLR in the home mobile communication network HPLMN. The text to be translated is set by the relevant numerical code CD, and the corresponding useful information TX2 is extracted from the table in place of the useful information TX1, incomprehensible to the subscriber and made available to the central subscriber data base HLR. The useful information comprising the German text "Zusatzdienst



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nicht verfügbar", which the subscriber can understand, inserted in a message USSD4, is sent by the central subscriber data base HLR to the responsible mobile switching centre VMSC and from it to the requesting subscriber station MS.

Special codes enabling the request to be transmitted directly to the home mobile communication network and hence to the central subscriber data base HLR may be inserted in the message USSD3, by which a translation of the text displayed by the subscriber station MS is initiated. The code table CTV or CTH contains numerical codes, by means of which useful information can be set in a specific language in every mobile communication network. The entries in the code tables CTV, CTH are therefore defined as standard for the mobile communication networks within the GSM mobile communication system. The respective network operator of the mobile communication network can determine the language into which the useful information should be translated by entering corresponding text codes in the tables. If several languages are available for different subscribers within a mobile communication network, corresponding text codes must be set for every text in the respective language by the code tables.

Figure 2 shows the data flow between the systems of the mobile communication network in the situation where, following the actual message USSD1 from the mobile switching centre VMSC responsible for the subscriber, a message USSD2' containing the request IS and the numerical code CD is addressed to the central subscriber data base HLR in the home mobile communication network HPLMN. The advantage of this is that the useful

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information can be provided rapidly in a language which the subscriber understands without a message having to be sent back to the subscriber station MS first and without the request for a translation of the useful information transmitted in the incomprehensible language having to be sent. On the basis of the relevant request IS and the numerical code CD received, the central subscriber data base HLR interrogates the associated code table CTH for the corresponding useful information in another language.

10 The useful information TX2 with the wording "Zusatzdienst nicht verfügbar" supplied in the example described above is sent by the central subscriber data base HLR in the message USSD3' to the responsible mobile switching centre VMSC in the mobile communication network VPLMN and from there back to the requesting subscriber station MS. The useful information received in the mobile communication network VPLMN can therefore be switched to the subscriber or subscriber station MS transparently by the mobile switching centre VMSC.

20 Figure 3 illustrates the data flow between the subscriber station MS, the mobile switching centre VMSC in the mobile communication network VPLMN currently responsible for the subscriber and separate control units SCP and CSV, of which control unit SCP is a service control unit enabling the use of services in an intelligent network and control unit CSV is a service control unit enabling the use of services specific to the network operator in addition to existing services in the GSM mobile communication network. The separate service control units SCP and respectively CSV are also connected to associated code tables CTS and respectively CTC, in which numerical codes and corresponding useful

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information are contained in a desired language. On receiving the message USSD1 initiated from the subscriber station MS, the mobile switching centre VM-SC responsible for the subscriber sends the request IS and the numerical code CD to the separate service control unit SCP or CSV, which calls up the useful information TX2 in the set language from the code table CTS or CTC on the basis of the numerical code CD received. The useful information TX2 is transmitted in the reverse direction between the separate service control unit SCP or CSV and the responsible mobile switching centre VMSC, from where it is transmitted to the requesting subscriber station MS in the message USSD2'. Information is transmitted between mobile communication home systems and mobile communication foreign systems - in this particular case between the mobile switching centre VMSC and the separate service control unit SCP or CSV - using the existing transfer protocol used to connect mobile communication networks to other networks.

In the case where the mobile switching centre VMSC automatically issues a request IS before transmitting the incomprehensible useful information as illustrated in Figures 2 and 3, the language code for identifying a language desired by the subscriber can be provided by the mobile switching centre VMSC itself. The decentralised subscriber data base VLR checks whether this language code has been entered in the subscriber data stored for the subscriber as a subscriber datum and, if the language code does exist, the corresponding useful information TX2 in the language indicated is made available from the code table connected to the decentralised subscriber data base VLR, which is not illustrated for this situation in

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Figures 2 and 3, and returned directly to the subscriber station MS. This being the case, there is no need for a request to be sent to the central subscriber data base in the home mobile communication network illustrated in Figure 2 or the service control unit SCP, CSV illustrated in Figure 3.

By transmitting a numerical code in the messages, the useful information to be sent to the subscriber or subscriber station can be requested in every mobile communication network by means of corresponding useful information in another - comprehensible - language. The request for information in a language which the subscriber understands may be initiated by the actual subscriber or subscriber station or by the currently responsible mobile switching centre in the mobile communication network which the subscriber is visiting at the time. The requested useful information in the language which the subscriber understands is read out on request from a code table in which the numerical code and the corresponding useful information are entered in a specific language.

#### Claims

1. Method of transmitting messages which are respectively sent from a mobile communication network (VPLMN) to a subscriber and received by a subscriber station (MS), where the subscriber is not located in his home mobile communication network (HPLMN) and his subscriber data is not registered in a central subscriber data base (HLR), and is serviced by a mobile switching centre (VMSC) which is currently responsible for him in another mobile

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communication network (VPLMN) and has an associated decentralised subscriber data base (VLR) in which his subscriber data is temporarily stored, characterised in that

5 the messages (e.g. USSD2) respectively contain a numerical code (CD) by means of which the useful information to be imparted in the message (e.g. TX1), which is not available in a language which the subscriber understands, can be assigned to  
10 corresponding useful information (e.g. TX2) in another language and, on receiving or prior to transmitting the incomprehensible useful information in the message (e.g. USSD2), the corresponding useful information (e.g. TX2) can be called up from  
15 a code table (CTH) in the subscriber's home mobile communication network (HPLMN) and transmitted to the subscriber station in a message (e.g. USSD4).

2. Method as claimed in claim 1,  
20 characterised in that  
on receipt of the incomprehensible useful information in the message (e.g. USSD2) from the subscriber station (MS) of the subscriber together with the numerical code (CD), a request (IS) for  
25 transmission of the corresponding useful information (e.g. TX2) in the other language is addressed to the mobile switching centre (VMSC) currently responsible for the subscriber in the other mobile communication network (VPLMN).

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3. Method as claimed in claim 2,  
characterised in that

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the request (IS) and the numerical code (CD) are forwarded by the currently responsible mobile switching centre (VMSC) in the other mobile communication network (VPLMN) to the central subscriber data base (HLR) in the subscriber's home mobile communication network (HPLMN) and the corresponding useful information (e.g. TX2) in the other language is obtained from the code table (CTH) connected to the central subscriber data base (HLR) and sent back to the subscriber station (MS) via the currently responsible mobile switching centre (VMSC).

4. Method as claimed in claim 1, characterised in that prior to sending the incomprehensible useful information in the message, the currently responsible mobile switching centre (VMSC) sends a request (IS) together with the numerical code (CD) to the central subscriber data base (HLR) in the home mobile communication network (HPLMN) and the corresponding useful information (e.g. TX2) in the other language is obtained from the code table (CTH) connected to the central subscriber data base (HLR) and returned to the subscriber station (MS) via the currently responsible mobile switching centre (VMSC).

5. Method of transmitting messages, which are respectively sent from a mobile communication network (VPLMN) to a subscriber and received by a subscriber station (MS), where the subscriber is not

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located in his home mobile communication network (HPLMN) and is serviced by a mobile switching centre (VMSC) which is currently responsible for him in another mobile communication network (VPLMN) and has an associated decentralised subscriber data base (VLR) in which his subscriber data is temporarily stored,

characterised in that

the messages (e.g. USSD2) respectively contain a numerical code (CD) by means of which the useful information to be imparted in the message, which is not available in a language which the subscriber understands, can be assigned to corresponding useful information (e.g. TX2) in another language and, prior to transmitting the incomprehensible useful information in the message, the mobile switching centre (VMSC) responsible for the subscriber sends a request (IS) together with the numerical code (CD) to a separate control unit (SCP, CSV) and the corresponding useful information (e.g. TX2) in the other language can be obtained from a code table (CTS, CTC) connected to the separate control unit (SCP, CSV) and returned to the subscriber station (MS) via the currently responsible mobile switching centre (VMSC).

6. Method as claimed in claim 5,

characterised in that

the separate control unit is a service control unit (SCP) enabling the use of services in an intelligent network.

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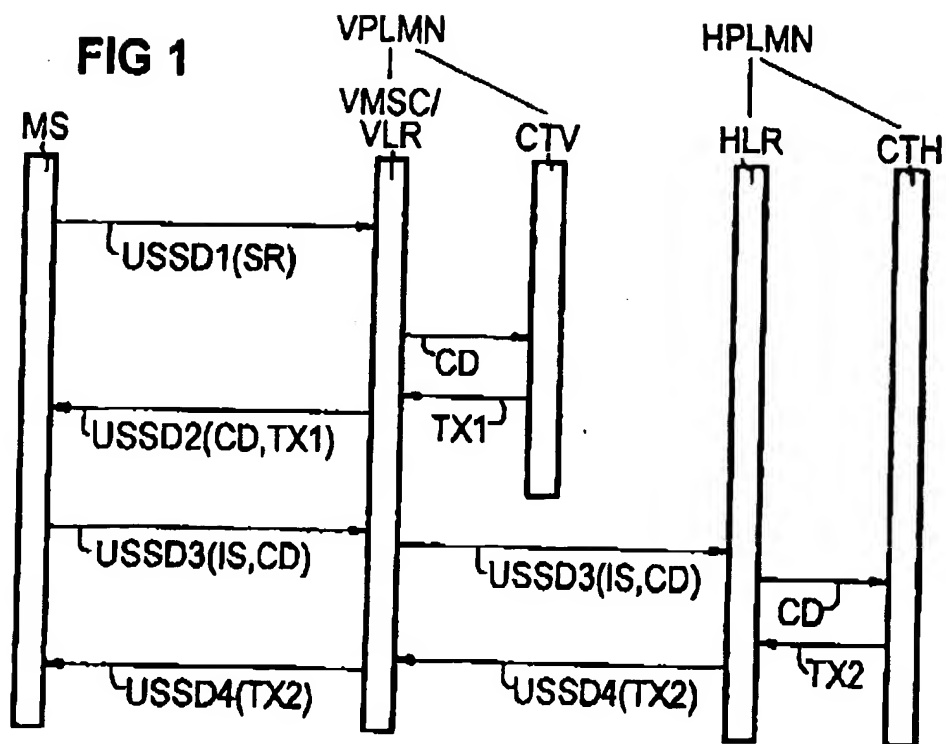
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7. Method as claimed in one of the preceding claims,  
characterised in that

5 a language code for identifying a language desired  
by the subscriber is sent in the request (IS) from the  
subscriber station (MS) to the currently responsible  
mobile switching centre (VMSC) or is supplied by the  
currently responsible mobile switching centre (VMSC)  
itself, and the central subscriber data base (VLR)  
interrogates to ascertain whether the language code  
10 exists as a subscriber datum and if the language code  
exists, the corresponding useful information (e.g.  
TX2) in the other language is obtained from a code  
table (CTV) connected to the decentralised subscriber  
data base (VLR) and returned directly to the  
15 subscriber station (MS).



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